

Correlation of Financial Literacy to Student Loan Debt, Numeracy, and Personal Finance Training

Honor Thesis

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Abstract

More Americans than ever before are attending college. Meanwhile, the cost of college has risen at a rapid rate. As a result, the quantity of student loans has skyrocketed. As of January 2016, there is over \$1.3 trillion in current student loan debt outstanding in America. The increased prevalence of these powerful financial instruments in Americans' lives could lead to destruction if the borrowers of these funds don't fully comprehend the finances behind their loans. Although many college students have limited financial experience beyond the use of their debit card, those with loans have committed a major financial transaction and should theoretically have the financial literacy to understand it. The aim of this research was to determine if there is indeed any correlation between student loan debt and financial literacy – does the average student with loans have a significantly higher financial literacy score than the average student without loans? Additionally, the research aimed to identify other correlations with financial literacy, such as with numeracy and personal finance training. Ohio State University students (N=399) completed a three-part survey comprised of a demographic section, a financial literacy test, and a numeracy test. There are several findings of note: First, there was no significant difference in students' financial literacy scores based on whether they had student loans or not. Second, a significant correlation existed between students' financial literacy and numeracy scores. This is as expected as it is presumably difficult for a student with poor numeracy to have strong financial literacy because finance is predominately driven by numbers. Third, students who have had some personal finance training had significantly greater financial literacy than those who have not. This result suggests that there may be real value in educating teenagers on the fundamentals of finance.

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Background

“Financial literacy can be described as the ability to make informed judgments and to take effective actions regarding the current and future use and management of money. It includes the ability to understand financial choices, plan for the future, spend wisely, and manage the challenges associated with life events such as a job loss, saving for retirement, or paying for a child’s education.” (Hillman 2009).

In the wake of the financial crisis of 2008, financial literacy has been a hot topic amongst finance professionals, educators, and government officials alike. The United States government has made significant strides in better understanding financial literacy and beginning the long and arduous fight against widespread financial illiteracy in America. The Federal Financial Literacy and Education Commission created MyMoney.gov, a website designed to “to strengthen financial capability and increase access to financial services for all Americans.” On MyMoney one can find over “400 reports and articles from federally funded research” (mymoney.gov). Among that research, one will find several studies on retirement, national test averages, guidelines for prevention, and many other topics.

Financial Literacy is an important topic because the potential outcomes of being financially illiterate are disastrous, as explained below by Gene Dodaro of the Government Accountability Office:

“The recent financial crisis revealed that many borrowers likely did not fully understand the risks associated with alternative mortgage products, resulting in substantial increases in defaults and foreclosures that continue to expose borrowers to financial risk and be a drag on the economy today...Further, about 25 percent of U.S. households either have no checking or savings account or rely on alternative financial products or services that are likely to have less favorable terms or conditions, such as nonbank money orders, nonbank check-cashing services, or payday loans.” (Dodaro 2011).

It only takes a few ill-advised financial decisions for a financially illiterate individual to find themselves deep in debt and unable to save the money they need to pay off the loan or begin to plan for their future. Even worse, the financial illiteracy of some can impact the overall well-being of all, as our economy consists of countless intertwined financial mechanisms. Financial literacy is necessary for “restoring upward economic mobility and reducing the widening income and wealth gap; sparking entrepreneurship, which drives job growth” (Rogers et al. 2013). These are important macroeconomic subjects that impact all of society and their growth is important for the nation’s economic wellbeing.

The negative impacts of not understanding finance affects Americans of all demographics. This research is, however, focused on the financial literacy of one demographic: college students. One of the primary existing pieces of research referenced is the National Student Financial Wellness Study (Montalto et al. 2015). This study “is a national survey of college students examining the financial attitudes, practices and knowledge of students from institutions of higher education across the United States” (Montalto et al. 2015). The study covered 52 institutions during Autumn 2014 and Winter 2015, received over 18795 responses, and reported the following findings, among others, about student loans:

- “The majority of students (64.0%) use loans to pay for college.
- Students with educational debt are most likely to report taking out federal loans (71.1%).
- Only 67.8% remember the entrance counseling they received for their student loans.”

(Montalto et al. 2015).

Going to college continues to present itself as a very appealing option to high school graduates. Studies show that “the earnings premium for a college degree relative to a high school degree has nearly doubled in the last three decades” (Avery Turner 2012). Additionally, the unemployment rate (4.4%) is nearly half of that of high school graduates. Despite the pressures the Great Recession put on the job market, college continues to be a great opportunity for Americans to set themselves up for job security and financial success. For that reason, “undergraduate enrollment has increased from 10.5 million in 1980 to 17.6 million in 2009” (Avery Turner 2012). An increasing number of teenagers are enrolling in college,

and, accordingly, an increasing number of Americans are obtaining student loans in order to fund their education.

As the opportunity to attend college grows increasingly more attractive to applicants, the need for financial aid increases as well. The annual volume of federal loans has increased from 2.3 million loans in 1980 to 10.9 million loans in 2009 (finaid.org). The United States government, recognizing the potential economic impact of a higher educated society, has attempted to ensure that its citizens are able to pay for school. Despite their prevalence, student loans are a rather complex instrument. These loans are easily adapted, modified, and reconfigured to meet specific situations. Students are able to receive multiple loans from multiple sources and “interest may or may not be deferrable depending on the student’s financial need, enrollment status, and post-graduate studies or job situation” (Andruska et. al 2014). Financial literacy is imperative for students to understand the loans they have accepted and the impact these loans will have on their lives after they graduate from college.

Finance is a language fundamentally constructed with numbers. When examining a group’s financial literacy, it is important to also explore the participants’ understanding of the numerical building blocks of finance – an understanding known as numeracy. Numeracy is defined by Dr. Ellen Peters as “the ability to process basic probability and numeracy concepts” (Peters et al. 2006). Says Dr. Peters, “Results from the National Adult Literacy Survey indicate that about half of Americans lack the minimal skills necessary to use numbers embedded in common printed materials” (Peters 2012). This means that only about half of the survey sample would be able to correctly calculate their change from the price on a restaurant menu. Calculating change appears a simple task when compared to comprehending something as complex as the compounding interest rate of a loan. This research adds to Dr. Peters and others’ research by attempting to identify if there is any correlation between an individual’s numeracy and their financial literacy.

There is a wide variety of resources available for individuals to develop their financial literacy. There are several websites, some funded by the government and some privately, with training materials readily available for free to those who seek them. Some lenders require individuals to complete a

financial counseling session before allowing them to accept a loan. In many high schools and college, personal finance and financial planning courses are offered... and in some cases even required. However, despite their availability, not every college student has received this training. In the National Student Financial Wellness Survey, which found that 64.0% of students surveyed used loans to pay for college, only 30.6% respondents said they attended a class/workshop in high school and even less, 22.9%, reported that they attended one in college (Montalto et al. 2015). Given the prevalence of these classes and workshops, one would expect a higher attendance rate. Before further encouraging individuals to attend these workshops, one wonders about the actual impact they are having on the students who attend them. This research seeks to add to the discussion of how helpful personal finance classes are by identifying if there was a noticeable increase in the financial literacy of individuals who have attended this personal finance training in comparison to their untrained peers.

Hypotheses

This research sought out to explore three specific hypotheses related to financial literacy, student loan debt, personal finance training, and numeracy in college students.

The first hypothesis was that the mean financial literacy score of students with student loans will be greater than that of students without student loan debt. While one may suggest that the notion of “debt” is generally indicative of financial mismanagement, in the situation of student loans that is not always the case. As opposed to traditional debt, commonly considered a punishment for past financial mistakes, a student loan is more adequately characterized as an indictment of an individual’s economic background and not of past financial mistakes. This hypothesis reasoned that an individual with student loan debt would have a higher financial literacy because they have encountered a complex financial instrument which they would have had to be at least moderately financially literate to understand. Based on the assumption that one would not accept a loan they did not understand, it was hypothesized that individuals who had accepted a loan would thus have a high literacy score. I considered it like a muscle; someone who has exercised a muscle would presumably have a stronger muscle than someone who had not. Likewise, someone who has had to exercise their financial literacy would presumably have a stronger financial literacy. The hypothesis was as follows:

H_0 : The sample mean financial literacy score of students who claim to have student loan debt is equal to the sample mean financial literacy score of students who claim no debt.

H_1 : The sample mean financial literacy score of students who claim to have student loan debt is greater than the sample mean financial literacy score of students who claim no debt.

The second hypothesis was that there would be a positive correlation between participants’ financial literacy and their numeracy. This hypothesis is supported by the fact that finance is

fundamentally built on numbers – it would be very uncommon and rather challenging for one to be financially literate but innumerate. The aim of this hypothesis was to identify a correlation and determine the magnitude with which participants' numeracy correlated with their financial literacy. The hypothesis was as follows:

H_0 : There is no correlation between financial literacy scores and numeracy scores.

H_1 : There is a positive correlation between financial literacy scores and numeracy scores.

The third hypothesis was that the mean financial literacy score of students who had some degree of personal finance training in high school or college would be greater than the mean financial literacy score of students who had no personal finance training. A statistically significant bump would be potentially indicative of the positive impact that personal finance workshops have on the individuals who attend them, though this correlation could also be explained by a handful of other variables. The hypothesis was as follows:

H_0 : The sample mean financial literacy score of students who have attended a personal finance class or workshop is equal to the sample mean financial literacy score of students who have no personal finance training experience.

H_1 : The sample mean financial literacy score of students who have attended a personal finance class or workshop is greater than the sample mean financial literacy score of students who have no personal finance training experience.

Methods

The study consisted of self-reported survey data. The participants in the research were students at The Ohio State University. There were 399 valid, completed submissions of the survey (validity metrics will be discussed later). In order to adequately share the survey, assistance with distribution was requested from a variety of professors and advisors. The following professors and advisors at The Ohio State University shared the voluntary online survey with their students: Bruce Bellner, Ty Shepfer, Dr. Daniel McDonald, Kim Bader, Beth Pittman, and Joe Santangelo. These individuals shared the survey link with an estimated 2,000 students. Some professors incentivized their students with a small extra credit opportunity for completion, while others simply encouraged their students to complete the survey.

Students were given a link to an online Qualtrics survey. The survey was open for 10 days in December 2015 and was accessible to any student who had access to the internet. The survey was 57 questions long and included informational questions, a 13 question financial literacy scale, and an 8 question numeracy scale. Each student completed the same survey with the same order of questions.

The financial literacy and numeracy scales used were adapted from a report published in 2014 by Daniel Fernandes, John. G Lynch Jr., and Richard G. Netemeyer (Fernandes et al. 2014). The thirteen question financial literacy scale covers a variety of financial topics including asset class behavior and compounding interest rates. There were five true-or-false questions and eight multiple choice questions. Each question had 1 correct response, 1-3 incorrect responses, a “do not know” response, and a “refuse to answer” response. A sample question is below in Figure 1. These questions can be found in their entirety in Appendix A.

The eight question numeracy scale was also adapted from the Fernandes, Lynch, and Netemeyer report mentioned above. These questions predominately deal with percentages and decimals. All eight questions were multiple choice questions. Each question had 1 correct response, 5-7 incorrect responses, and a “do not know” response. A sample question is below in Figure 2. As with the financial literacy questions, these questions can be found in their entirety in Appendix A.

Suppose you owe \$3,000 on your credit card. You pay a minimum payment of \$30 each month. At an annual percentage rate of 12% (or 1% per month), how many years would it take to eliminate your credit card debt if you made no additional new charges?

Less than 5 years

Between 5 and 10 years

Between 10 and 15 years

Never

Don't know

Refuse to answer

Figure 1. Sample Financial Literacy Question

In the ACME PUBLISHING SWEEPSTAKES, the chance of winning a car is 1 in 1,000. What percent of tickets of ACME PUBLISHING SWEEPSTAKES win a car?

0.001%

0.01%

0.1%

1.0%

1.1%

None of the above

I do not know

Figure 2. Sample Numeracy Question

Results

Originally, the survey registered 459 responses. However, only 399 of these 459 responses were considered valid – 60 responses were thrown out for a variety of reasons. Firstly, 3 participants were trial runs by the creators of the survey. These 3 were removed from the response pool. Secondly, 37 participants were removed from the response pool because they did not complete the financial literacy scale. Thirdly, an additional 10 participants were removed who, though they completed the financial literacy scale, did not answer every question in the numeracy scale. Lastly, there were an additional 10 participants removed because it is believed that they did not legitimately attempt the tests. These 10 participants answered every question with “do not know” or “refuse to answer” and completed the survey in less than 10 minutes. This is reasonable evidence that they did not actually complete the test to the best of their ability and keeping them in would negatively impact the validity of the data. After these deductions, the results are comprised of the responses of 399 participants.

It was identified after the completion of the research that there was a clerical error with one of the eight numeracy questions. This question was removed from the pool and participants were scored out of the seven remaining questions.

The response pool was 48% male and 50% female (2% of participants elected not to share their gender). This is demonstrated below in Figure 3.

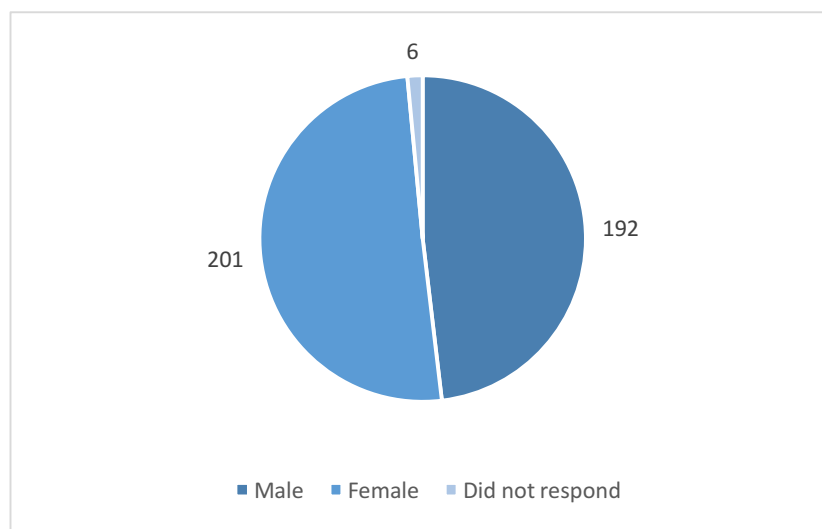


Figure 3. Gender Distribution

Of the 399 participants, 152 claimed to have some student loan debt while 221 claimed to have no student loan debt (26 responders elected not to disclose this information). This is shown below in Figure 4.

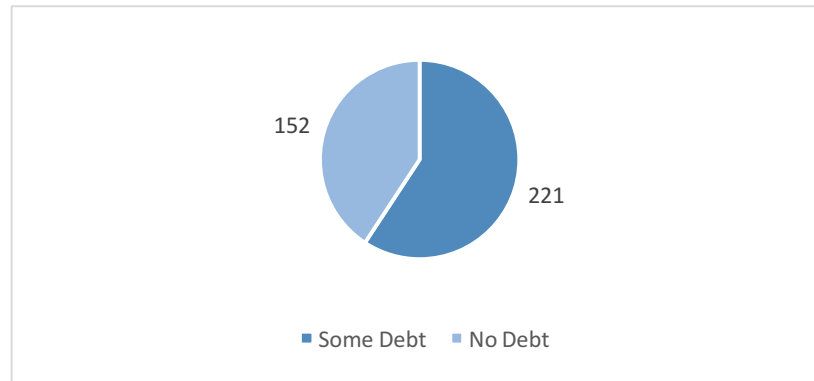


Figure 4. Debt Distribution

Additionally, of the 399 participants, 105 participants attended personal finance workshops or classes while they were in high school, 34 participants attended personal finance workshops or classes while they were in college, 32 participants attended personal finance workshops or classes in both high school and college, and 222 participants have never attended a personal finance workshop or class (6 responders elected not to disclose this information). This is demonstrated below in Figure 5.

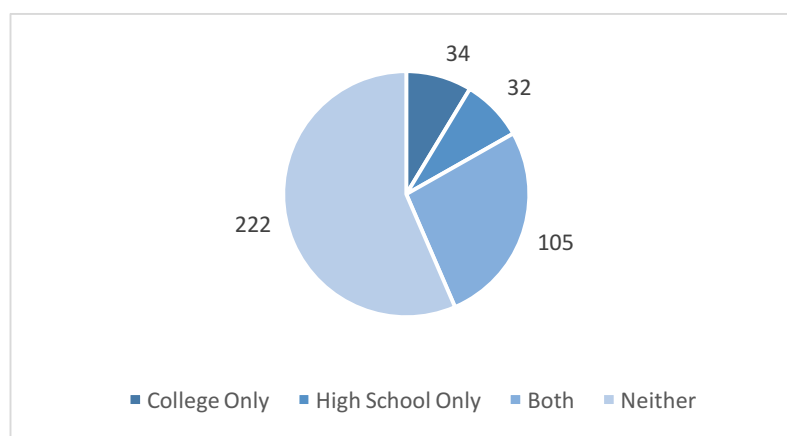


Figure 5. Personal Finance Class/Workshop Experience

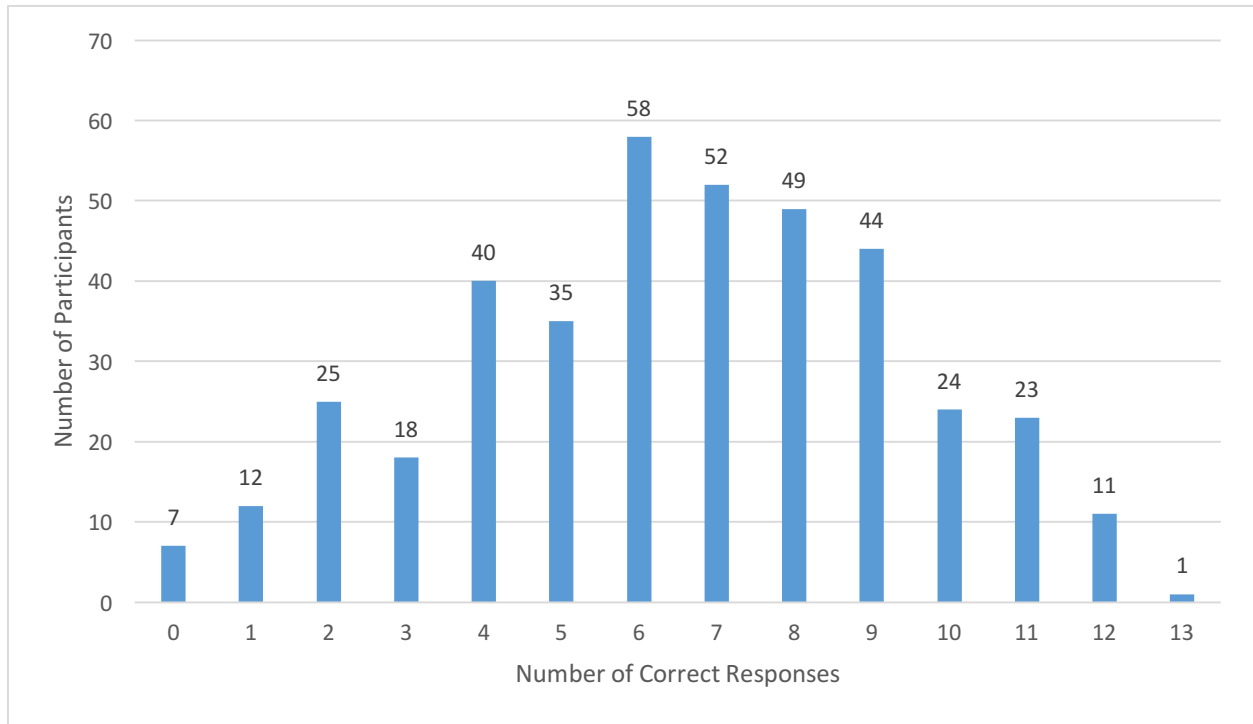


Figure 6. Financial Literacy Score Distribution

The mean number of correct answers on the financial literacy scale was 6.49 out of 13, or 49.91% correct. The median number of correct answers on the financial literacy scale was a 7 out of 13. Only one of the 399 participants correctly answered each question. The responses appear to be normally distributed. This distribution is demonstrated above in Figure 6.

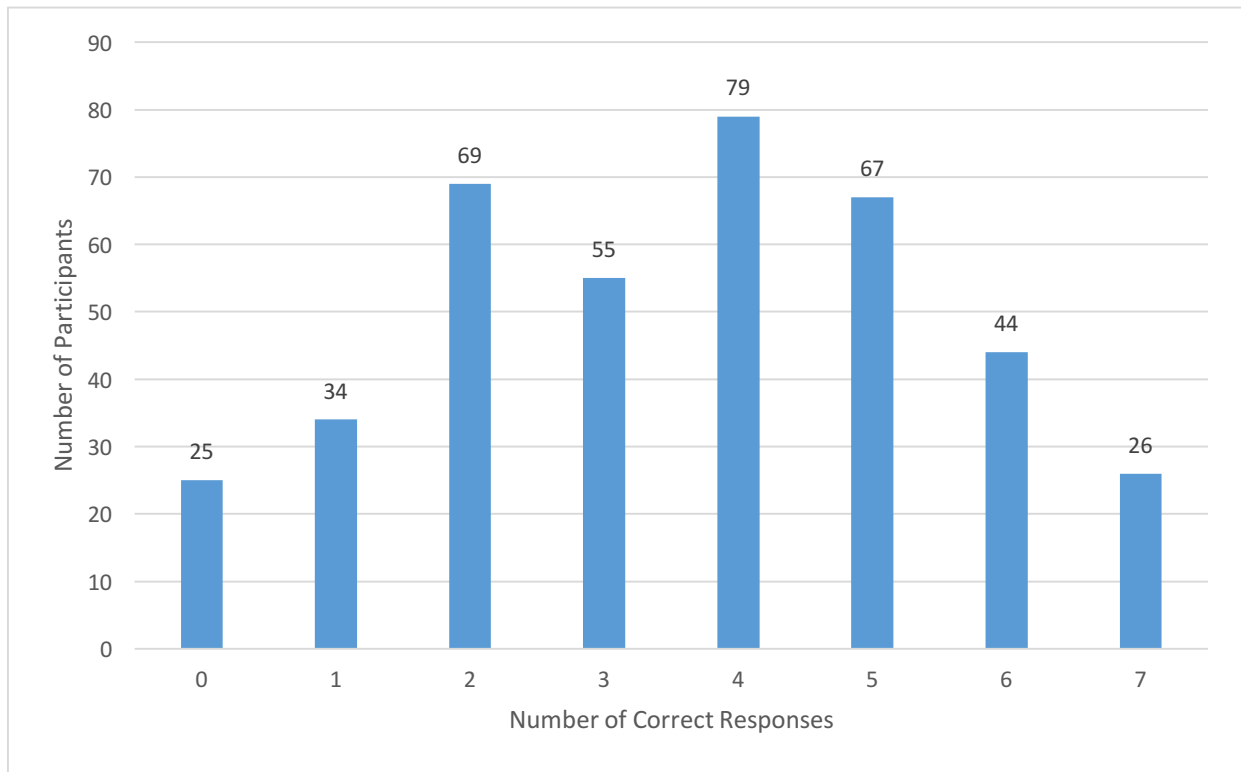


Figure 7. Numeracy Score Distribution

The mean number of correct answers on the numeracy scale was 3.59 out of 7, or 51.34% correct. The median number of correct answers on the financial literacy scale was a 4 out of 7. 26 of the 399 participants correctly answered each question. The responses appear to be normally distributed. This distribution is demonstrated above in Figure 7.

Hypothesis 1 is as follows:

H_0 : The sample mean financial literacy score of students who claim to have student loan debt is equal to the sample mean financial literacy score of students who claim no debt.

H_1 : The sample mean financial literacy score of students who claim to have student loan debt is greater than the sample mean financial literacy score of students who claim no debt.

A two variable t-Test assuming unequal variances was given on the financial literacy scores of students with debt and the scores of students without debt. The t-Test suggested that the null hypothesis cannot be rejected. Not only was the mean financial literacy score of students with student loan debt not significantly greater than that of students without debt, it was actually not greater at all. As a matter of fact, the opposite was true. The mean financial literacy score of students with debt was actually *lesser* than the mean financial literacy score of students without debt. The t^* (df:319) was -2.157 and the p-value was .98415. With a significance level of .05, the null hypothesis cannot be rejected. The full statistical readout can be found in Table 1 in Appendix C.

Hypothesis 2 was as follows:

H_0 : There is no correlation between financial literacy scores and numeracy scores.

H_1 : There is a positive correlation between financial literacy scores and numeracy scores.

A regression analysis was completed between the two scores and the data suggested that the null hypothesis can be rejected. The analysis concluded that r (df:398) = .469 and p was virtually 0. At a significance level of .05, the null hypothesis can be rejected. The full statistical readout can be found in Table 2 in Appendix C.

Hypothesis 3 was as follows:

H_0 : The sample mean financial literacy score of students who have attended a personal finance class or workshop is equal to the sample mean financial literacy score of students who have no personal finance training experience.

H_1 : The sample mean financial literacy score of students who have attended a personal finance class or workshop is greater than the sample mean financial literacy score of students who have no personal finance training experience.

A two variable t-test assuming unequal variances was conducted on the financial literacy scores of students who had some financial workshop or class experience and the financial literacy scores of students with no such experience. The data suggested that the null hypothesis can be rejected. The t^* (df:377) was 4.81 and the p-value was virtually 0. With an alpha of .05, the null hypothesis can be rejected. The full statistical readout can be found in Table 3 in Appendix C.

Discussion

In synopsis, the null hypothesis of hypothesis 1 was unable to be rejected at the significance level of .05 because the p-value = .98415. The null hypothesis of hypothesis 2 was rejected at the significance level of .05 because the p-value was virtually 0. The null hypothesis of hypothesis 3 was rejected at the significance level of .05 because the p-value was again virtually 0.

Hypothesis 1 had some interesting results. Not only was the mean financial literacy score of students with student loan debt not significantly greater than the mean financial literacy score of students without student loan debt, but it was actually the lower of the two means. While this is not what was hypothesized would happen, I have some preliminary theories on why this is the result. It is important to note that these theories they are simply suggestions based on assumptions – there is no empirical data with which to support these suggestions

Firstly, perhaps students with exceptional financial literacy have strategically managed their money and are thus able to entirely pay for school with cash and not loans. According to The Ohio State University's website, tuition for the 2015-2016 school year is \$10,037. While this number is steep, it would not be impossible for an individual to work 40 hours a week in the summer and 20 hours a week during the school year to afford it. Additionally, if this student was able to live at his or her parents' house and commute, they would be able to extremely limit their expenses. Paying for college with cash would require strong financial maturity and tight money management, both of which are indicative of a strong financial literacy. If this were the case, students with a strong financial literacy falling into the "no debt" category would lift the category's mean financial literacy score.

Secondly, this hypothesis suggests that an individual who has obtained a major financial instrument such as a student loan would have accordingly developed a strong financial literacy in order to fully understand their loan. This hypothesis assumes that a student loan is the only major financial instrument a college student would interact with. This is, however, is not entirely true. Many college students also have car loans, credit cards, and even personal investment portfolios, among a handful of other options. Each of these debt instruments would provide an opportunity for an individual to develop

his or her financial literacy – this is not a learning opportunity exclusive to student loans. Perhaps members of the “no debt” category may have another type of loan and, in learning the workings of that loan, improved their financial literacy accordingly. It is then possible that enough students without debt had another financial experience strengthen their financial literacy to have positively raised the “no debt” category’s mean financial literacy score above that of students with debt.

Thirdly, this result could be as much the result of demographics as it is of anything. Previous financial literacy studies have shown that certain demographics tend to have a relationship with financial literacy – particularly the environment in which people live (Lusardi 2008). An individual from a higher income, higher educated family will likely have a higher financial literacy score than the nationwide average. Additionally, it is reasonable to assume that an individual hailing from a higher income family is less likely to require personal student-loans than one from a low-income family. Thus, it is possible that the individuals who have student loan debt have a lower mean financial literacy score than their peers simply because of their socioeconomic backgrounds and the correlating financial literacy trends within those backgrounds.

It is worthwhile to reiterate that these theories are merely assumption-laden speculation and not evidence-supported claims. It is merely an attempt to generate potential reasons for the results that were found. Ultimately, it is very unlikely that one of these theories entirely explains the result. The results are more likely explained by a combination of each theory or explained by something not mentioned.

The results to hypothesis 2 were as expected. Before jumping to conclusions, it is important to emphasize one of the most basic fundamentals in statistics: correlation does not equal causation. So while there was indeed a correlation between an individual’s financial literacy and their numeracy, one cannot use to claim that numeracy *causes* financial literacy.

However, the results should thrust numeracy firmly into the conversation on how to further improve America’s financial literacy. Along with their evidenced correlation, numeracy scores followed a similar pattern to financial literacy scores when compared by student loan debt and when compared by financial training experience. The numeracy scores of participants with student loan debt and the

numeracy scores of participants without student loan debt were not significantly different, shown in Table 4 of Appendix C. As with financial literacy, the numeracy scores of participants with personal finance training in either high school or college was significantly greater (at a 90% confidence level) than the numeracy scores of participants with no such training, shown in Table 5 of Appendix C. These exhibited behaviors continue to support the claim that numeracy is intertwined with financial literacy.

Perhaps most interesting, 78 participants who had attended personal finance courses in either high school or college scored a below average numeracy score. Not surprisingly, the average financial literacy score of these candidates was below average as well (46%). As numeracy scores sunk lower, financial literacy scores sunk as well. The average financial literacy score of the participants who got a 0/7 on the numeracy test was a 37%, shown in Table 6 of Appendix C. And these are individuals who *have* had some personal finance training, which was found to have a correlation with an above average financial literacy score. Perhaps in the case of these participants, attending financial training classes was merely treating the symptoms but not actually resolving the core problem – these individuals are innumerate. Such individuals' financial literacy would benefit greatly from numeracy training. Perhaps curriculum shifts to include numeracy would further help personal finance classes and workshops be effective in alleviating American's personal finances woes.

As with hypothesis 2, hypothesis 3 turned out as expected. The null hypothesis was rejected because of the statistically significant increase in financial literacy scores of students with financial class/workshop experience over the scores of their peers without such experience. These results certainly lend credibility to the supporters of these classes as mandatory in order for teenagers to get a student loan. However, while it might be gratifying to claim that this correlation proves that financial classes and workshops increase students' financial literacy, it is important to once again emphasize the correlation does not equal causation. Several alternative theories for why these results might have occurred will now be addressed.

Firstly, it is possible that the individuals who attended a personal finance class or workshop did so willingly because of an existing affinity for personal finance. These individuals may have already had a higher than average financial literacy before ever attending the training session.

Additionally, demographics must once again be considered. Not every school district represented by the students who took this survey mandates personal finance classes in high school. It is possible that the schools who mandate these classes represent a demographic that has historically scored higher than the mean on financial literacy tests. If this is true, then these students may be walking into these financial classes and workshops with a preexisting above-average finance literacy.

Beyond showing a correlation with higher financial literacy and numeracy scores, participants with personal finance training experience exhibited some other interesting behaviors. 42% of participants with personal finance training experience knew the interest rate of their student loan, whereas only 25% of students with no personal finance training experience knew their interest rate, shown in Table 7 in Appendix C. These low percentages are concerning because they suggest that the majority of students surveyed do not know the amount of interest they have agreed to pay on their loans. The silver lining, however, is the sizeable increase in the proportion of students who know their interest rate when comparing students with personal finance training and students without the training. Similarly, students with some personal finance training exhibited a stronger likelihood to have a personal budget than those individuals without personal finance training. In this case, 59% of individuals who had attended a personal finance class or workshop in high school or college maintained a budget on either a weekly or monthly basis. On the other hand, only 41% of individuals with no personal finance training maintained a weekly or monthly budget, shown in Table 8 in Appendix C. Again, these trends cannot be cited as definitive causal relationships – but they are indicative of the possible positive impact of financial training classes.

My hope is that this research will be useful in furthering the conversation about financial literacy in America. In identifying no substantial improvement in the financial literacy scores of students with student loan debt, I hope to encourage individuals and organization to consider what they might be able to

do differently to ensure that any individual obtaining a student loan has a full understanding of the finance behind the loan. I hope that the identified correlations between numeracy and financial literacy and between financial training and financial literacy motivate and challenge the way instructors teach the foundations of personal finance to their students. My hope is that this research supports the notion to teach the fundamentals of math in order to develop the fundamentals of finance and that schools, organizations, and other institutions of power would continue to encourage young Americans to develop their financial literacy.

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Appendix A: Survey Questions

The following section will ask you thirteen questions about personal finance. Please answer each question to your full capability.

Do you think that the following statement is true or false?

"A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less."

True

False

Don't know

Refuse to answer

Do you think that the following statement is true or false?

"A stock mutual fund combines the money of many investors to buy a variety of stocks."

True

False

Don't know

Refuse to answer

Do you think that the following statement is true or false?

"After age 70 1/2, you have to withdraw at least some money from your 401(k) plan or IRA"

True

False

It depends on the type of IRA and/or 401(k) plan

Don't know

Refuse to answer

Do you think that the following statement is true or false?

"Bonds are normally riskier than stocks."

True

False

Don't know

Refuse to answer

Do you think that the following statement is true or false?

"If you were to invest \$1,000 in a stock mutual fund, it would be possible to have less than \$1,000 when you withdraw your money."

True

False

Don't know

Refuse to answer

Finish the following sentence:

If somebody buys a bond of firm B

- He owns a part of firm B
- He has lent money to firm B
- He is liable for firm B's debts
- None of the above
- Don't know
- Refuse to answer

Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy:

- More than today with the money in this account
- Exactly the same as today with the money in this account
- Less than today with the money in this account
- Don't know
- Refuse to answer

Normally, which asset described below displays the highest fluctuations over time?

- Savings accounts
- Stocks
- Bonds
- Don't know
- Refuse to answer

Suppose you have \$100 in a savings account and the interest rate is 20% per year and you never withdraw money or interest payments. After 5 years, how much money would you have in this account in total?

- More than \$200
- Exactly \$200

Less than \$200
Don't know
Refuse to answer

Suppose you owe \$3,000 on your credit card. You pay a minimum payment of \$30 each month. At an annual percentage rate of 12% (or 1% per month), how many years would it take to eliminate your credit card debt if you made no additional new charges?

Less than 5 years
Between 5 and 10 years
Between 10 and 15 years
Never
Don't know
Refuse to answer

When an investor spreads his money among different assets, does the risk of losing a lot of money:

Increase
Decrease
Stay the same
Don't know
Refuse to answer

Which of the following statements is correct?

Once one invests in a mutual fund, one cannot withdraw the money in the first year
Mutual funds can invest in several assets, for example invest in both stocks and bonds
Mutual funds pay a guaranteed rate of return which depends on their past performance
None of the above

Don't know

Refuse to answer

Considering a long time period (for example, 10 or 20 years), which asset described below normally gives the highest return?

Savings accounts

Stocks

Bonds

Don't know

Refuse to answer

The following section will ask you seven questions about math. Please answer each question to your full capability.

In the ACME PUBLISHING SWEEPSTAKES, the chance of winning a car is 1 in 1,000. What percent of tickets of ACME PUBLISHING SWEEPSTAKES win a car?

0.001%

0.01%

0.1%

1.0%

1.1%

None of the above

I do not know

In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long does it take for the patch to cover half of the lake?

16 days
24 days
25 days
32 days
26 days
22 days
27 days
I do not know

Imagine that we roll a fair, six-sided die 1,000 times. Out of 1,000 rolls, how many times do you think the die would come up as an even number? Of the values below, which is the most likely outcome?

157
298
512
754
919
The above answers are all equally likely
I do not know

If the chance of getting a disease is 20 out of 100, this would be the same as having a ____% chance of getting the disease.

0.02
.2
2
2.0
20
25
200

I do not know

If the chance of getting a disease is 10%, how many people would be expected to get the disease out of 1,000?

- 1
- 10
- 11
- 50
- 100
- 110
- 1,000
- None of the above
- I do not know

If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

- 1 minute
- 5 minutes
- 10 minutes
- 100 minutes
- 1,000 minutes
- 1 day
- None of the above
- I do not know

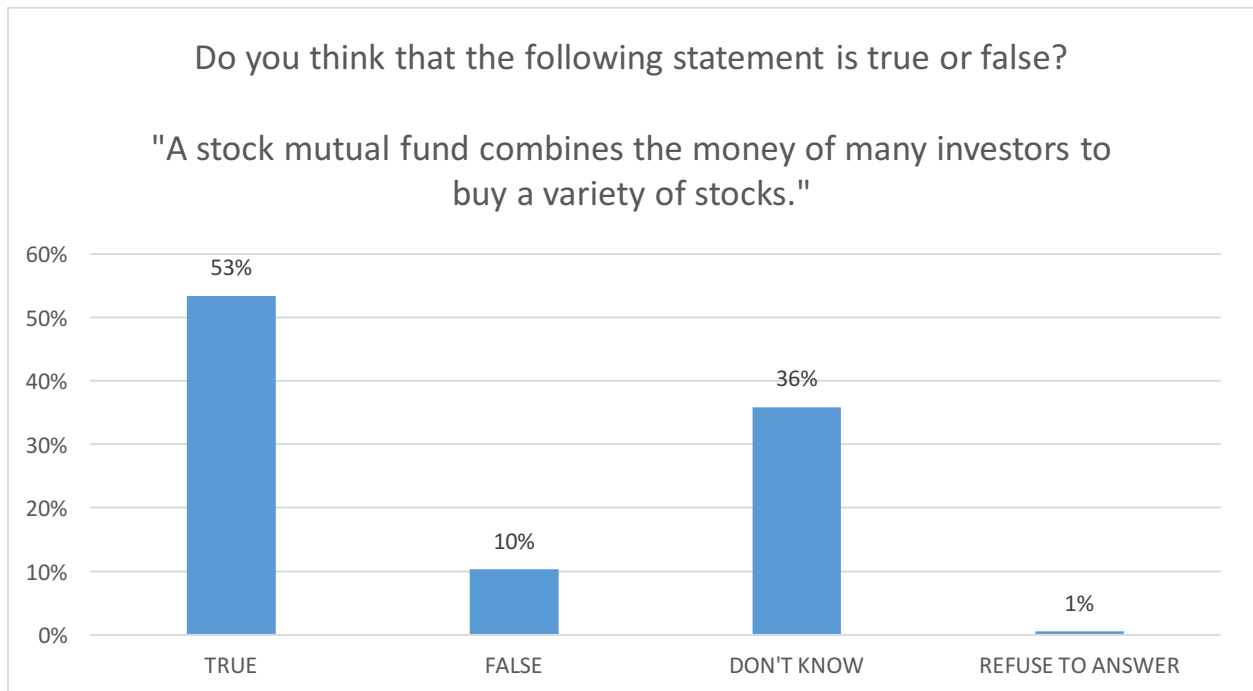
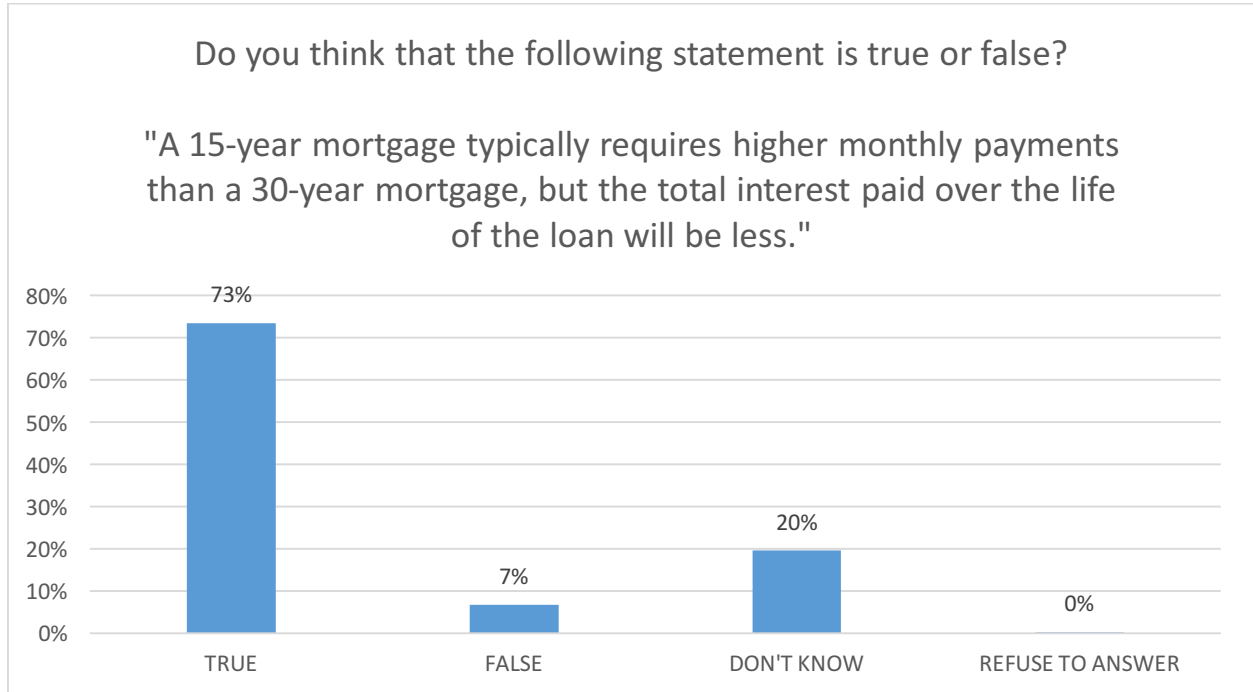
A bat and ball cost \$1.10 in total. The bat costs \$1.00 more than the ball. How much does the ball cost?

- 1 cent
- 5 cents
- 10 cents
- 11 cents
- 20 cents
- 100 cents
- 1 dollar
- I do not know

In the BIG BUCKS LOTTRY, the chances of winning a \$10.00 prize are 1%. What is your best guess about how many people would win a \$10.00 prize if 1,000 people each buy a single ticket from BIG BUCKS?

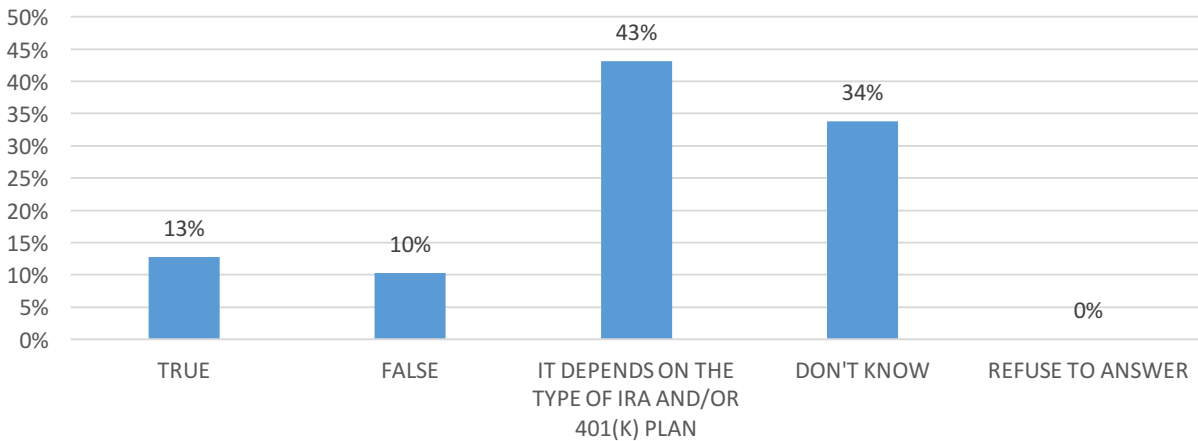
- 1
- 2
- 10
- 100
- 110
- The answers above are equally likely
- I do not know

Appendix B: Financial Literacy Responses



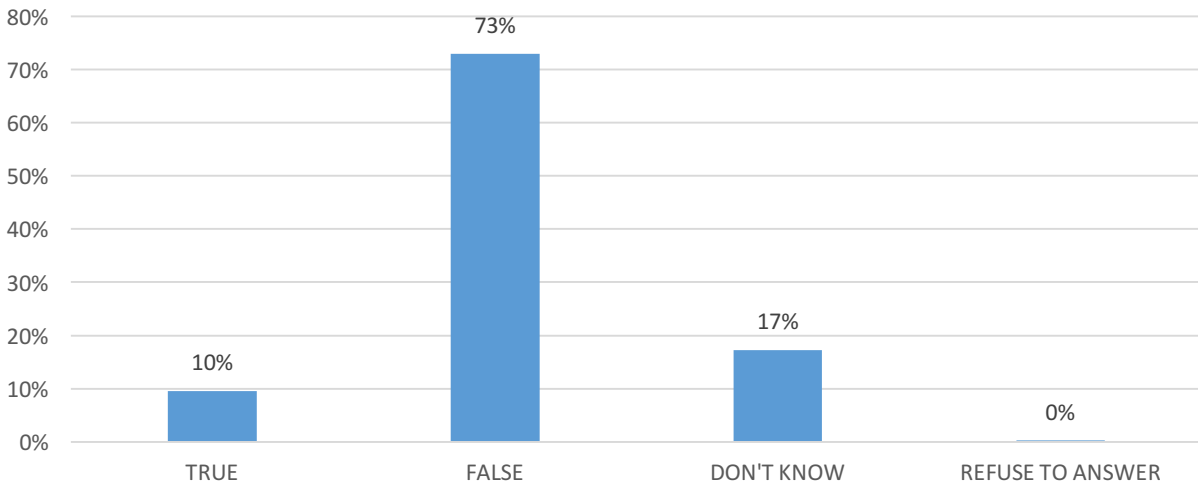
Do you think that the following statement is true or false?

"After age 70 1/2, you have to at least withdraw some money from your 401 (k) plan or IRA"



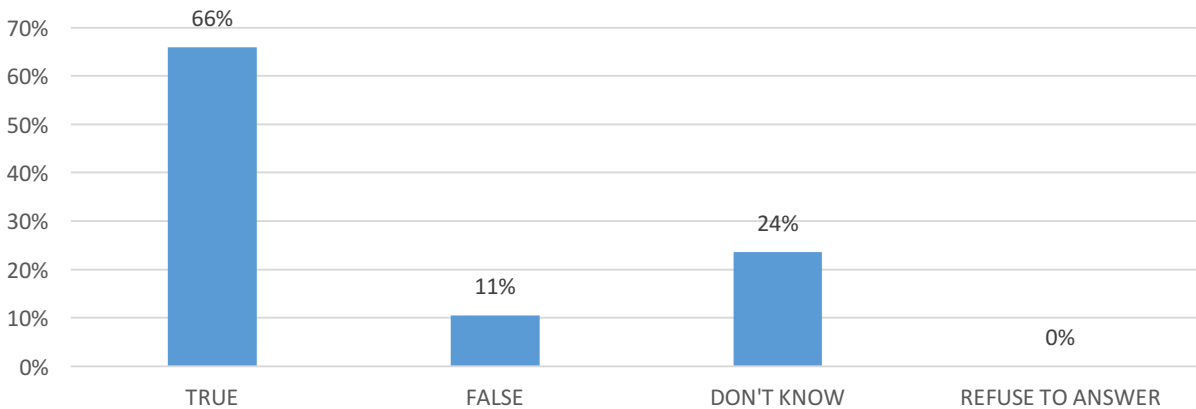
Do you think that the following statement is true or false?

"Bonds are normally riskier than stocks"



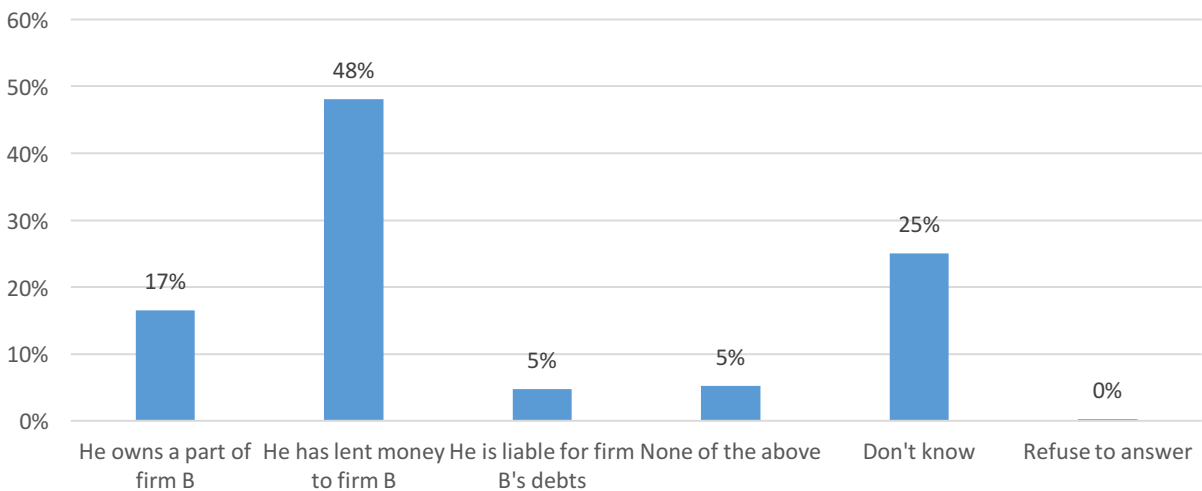
Do you think that the following statement is true or false?

"If you were to invest \$1,000 in a stock mutual fund, it would be possible to have less than \$1,000 when you withdraw your money"

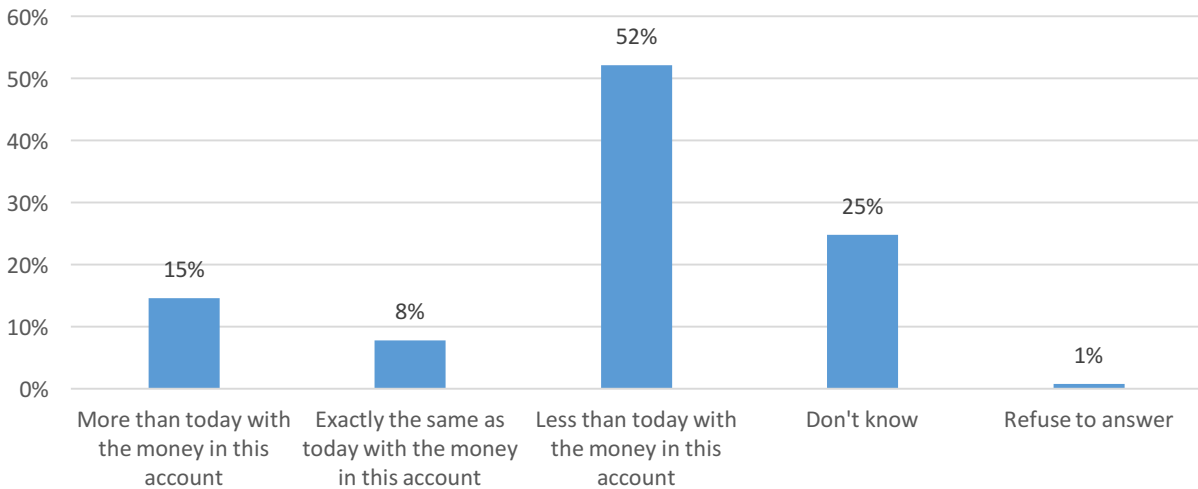


Finish the following sentence:

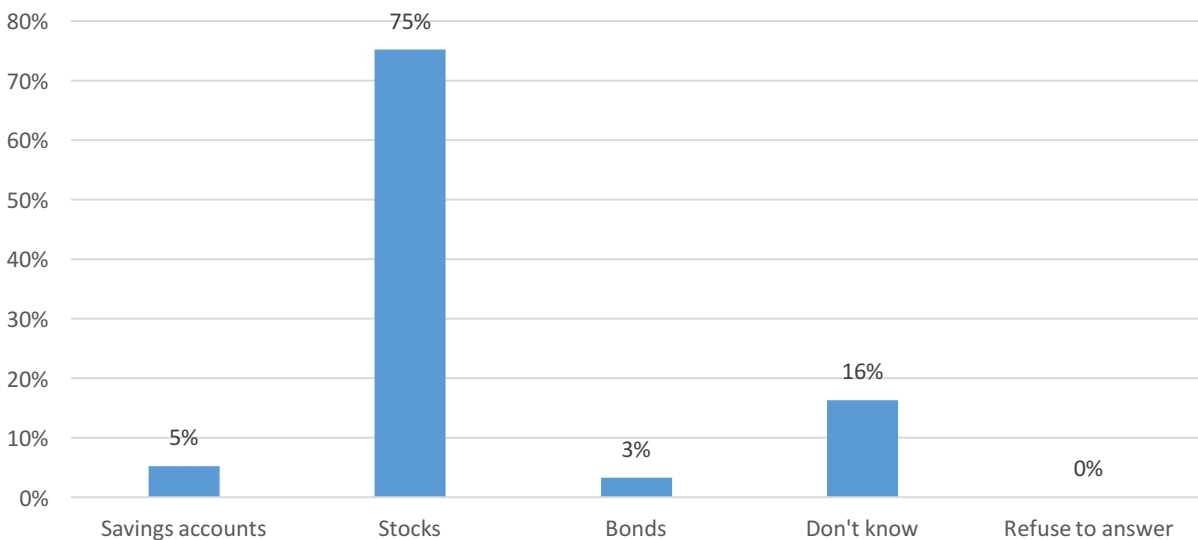
"If somebody buys a bond of firm B..."



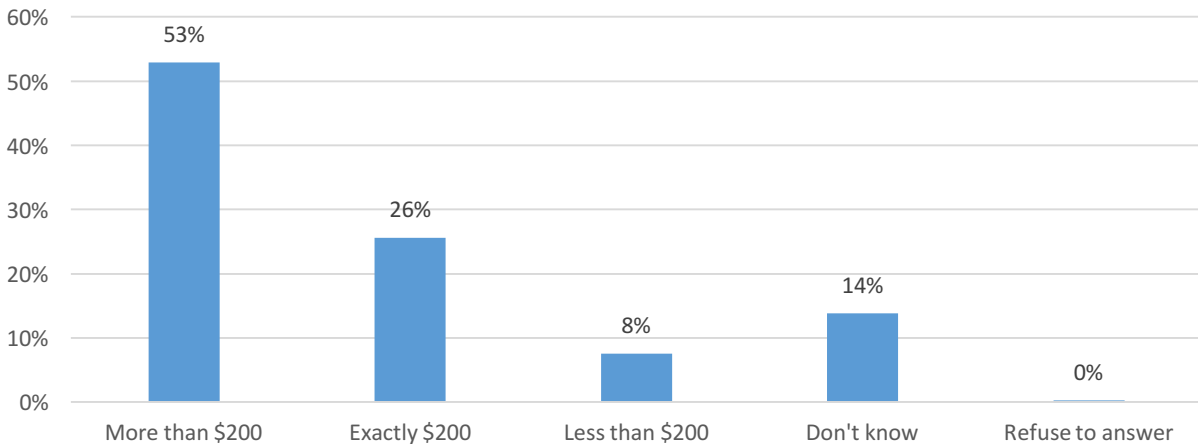
Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year you would be able to buy:



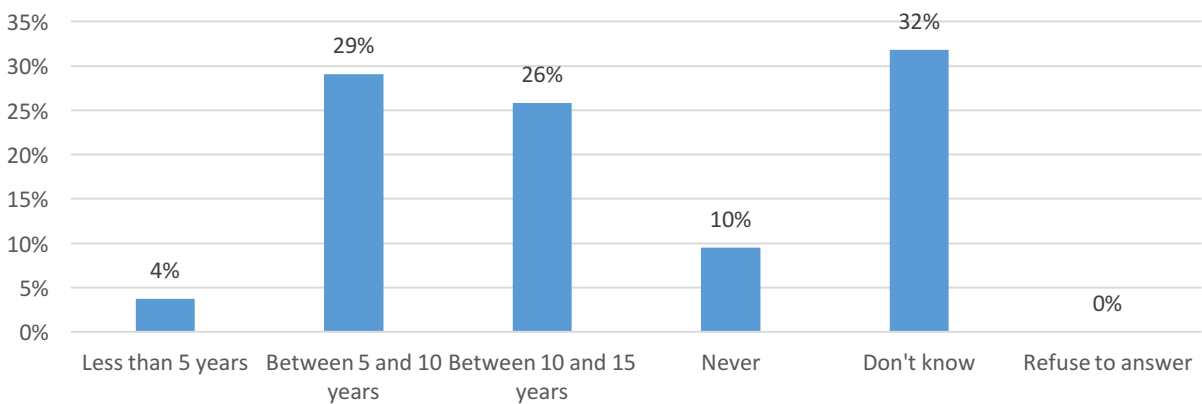
Normally, which asset described below displays the highest fluctuations over time?



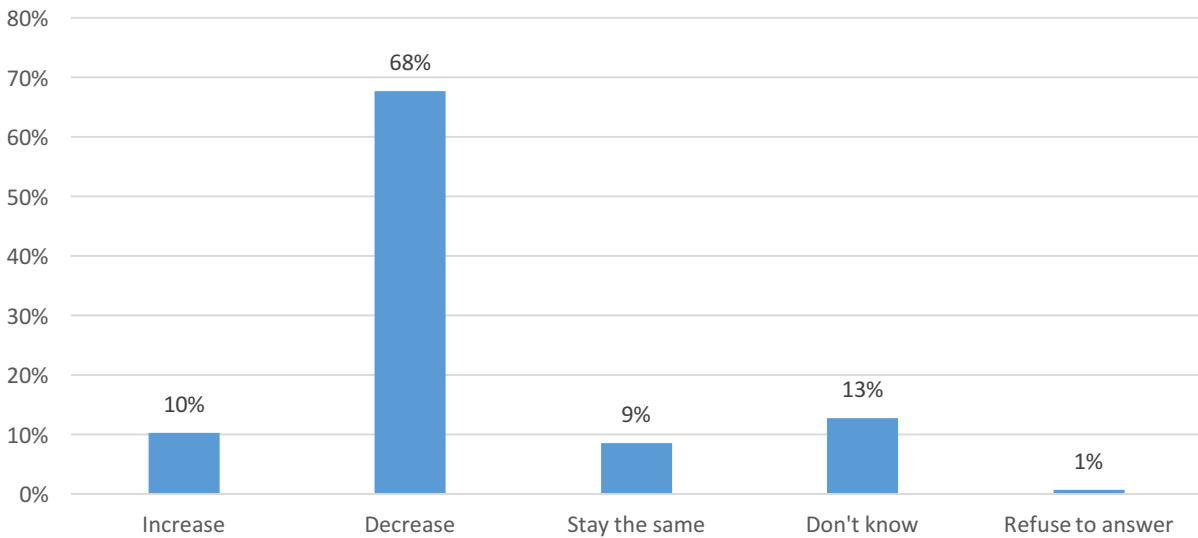
Suppose you have \$100 in a savings account and the interest rate is 20% year and you never withdraw money or interest payments. After 5 years, how much money would you have in this account in total?



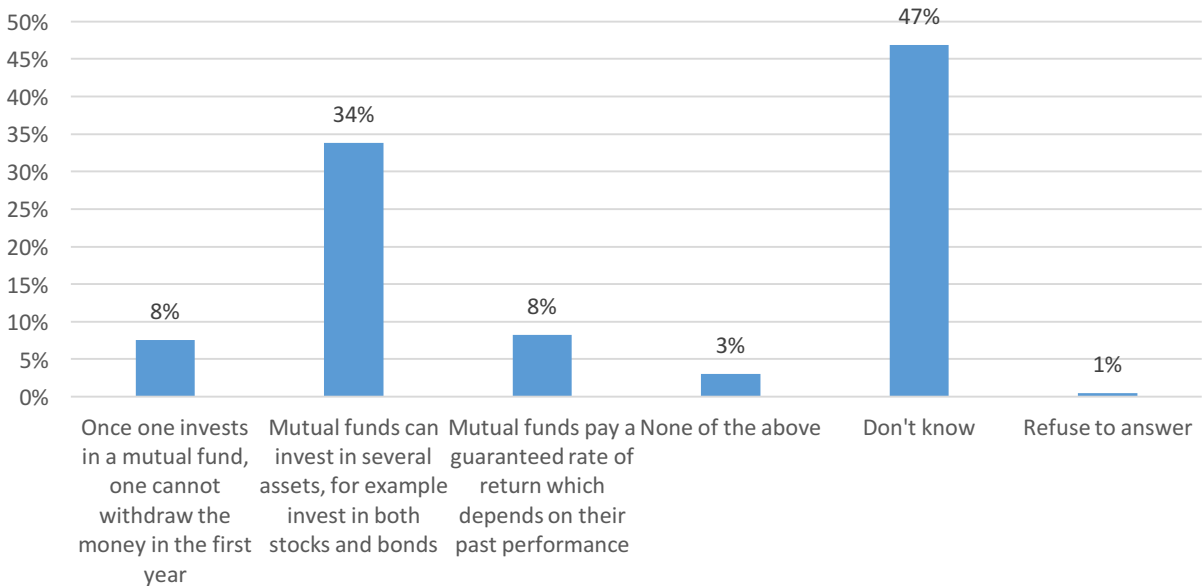
Suppose you owe \$3,000 on your credit card. You pay a minimum of \$30 each month. At an annual percentage rate of 12% (or 1% per month), how many years would it take to eliminate your credit card debt if you made no new additional charges?

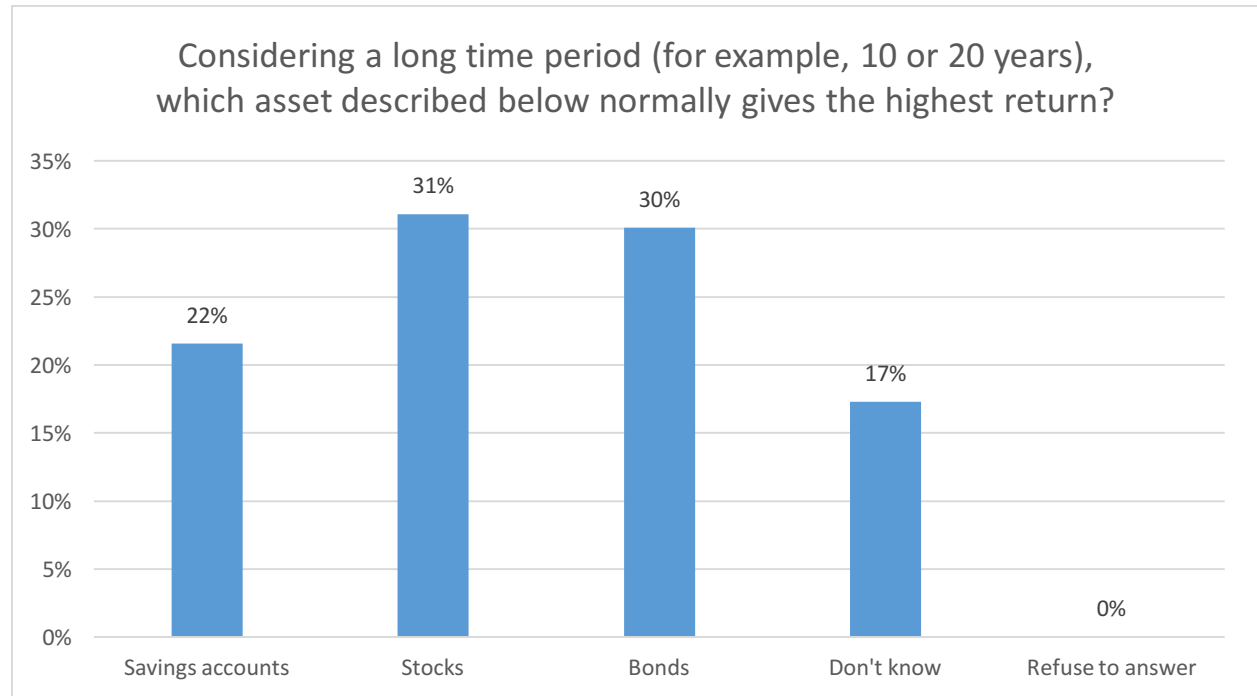


When an investor spreads his money among different assets,
does the risk of losing a lot of money:



Which of the following statements is correct?





Appendix C: Statistical Readouts

t-Test: Two-Sample Assuming Unequal Variances

	<i>No Debt</i>	<i>Debt</i>
Mean	6.8280543	6.17763158
Variance	7.92484574	8.35896654
Observations	221	152
Hypothesized Mean Difference	0	
df	319	
t Stat	-2.1578831	
P(T<=t) one-tail	0.98415852	

Table 1. Hypothesis 1 t-Test Results

<i>Regression Statistics</i>								
Multiple R	0.469389894							
R Square	0.220326873							
Adjusted R Square	0.218362961							
Standard Error	2.530946624							
Observations	399							

<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	718.6399949	718.6399949	112.187743	2.9622E-23			
Residual	397	2543.059253	6.405690814					
Total	398	3261.699248						

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	3.957012471	0.270530474	14.62686406	4.6409E-39	3.42516108	4.488863866	3.425161075	4.488863866
X Variable 1	0.704429585	0.066506621	10.59187155	2.9622E-23	0.5736804	0.83517877	0.573680399	0.83517877

Table 2. Hypothesis 2 Regression Results

t-Test: Two-Sample Assuming Unequal Variances

	<i>Variable 1</i>	<i>Variable 2</i>
Mean	7.2748538	5.92342342
Variance	7.15342277	8.21582895
Observations	171	222
Hypothesized Mean Difference	0	
df	377	
t Stat	4.81301576	
P(T<=t) one-tail	1.0775E-06	
t Critical one-tail	1.64890547	

Table 3. Hypothesis 3 t-Test Results

t-Test: Two-Sample Assuming Unequal Variances

	<i>Variable 1</i>	<i>Variable 2</i>
Mean	3.59729	3.60571
Variance	3.65072	3.68847
Observations	221	175
Hypothesized Mean Difference	0	
df	373	
t Stat	-0.0435	
P(T<=t) one-tail	0.48267	

Table 4. Numeracy Scores by Student Debt t-Test Results

t-Test: Two-Sample Assuming Unequal Variances

	<i>Variable 1</i>	<i>Variable 2</i>
Mean	3.75	3.47577093
Variance	3.13596491	4.00272894
Observations	172	227
Hypothesized Mean Difference	0	
df	387	
t Stat	1.44802122	
P(T<=t) one-tail	0.07421038	

Table 5. Numeracy Scores by Participant Financial Training Experience t-Test Results

Count	Numeracy	Average Financial Literacy	
10	0	4.80	37%
9	1	6.00	46%
30	2	5.21	40%
29	3	7.14	55%

Table 6. Average Financial Literacy for Participants with Below Average Numeracy and Some Financial Training Experience

Financial Training - Do you know your rate?						
With Financial Training	Count	Proportion	Literacy		Numeracy	
	21	42%	7.62	59%	3.90	56%
	29		6.79	52%	3.62	52%
Without Financial Training	Count	Proportion	Literacy		Numeracy	
	24	25%	5.71	44%	3.33	48%
	71		5.75	44%	3.70	53%

Table 7. Participants' Knowledge of their Student Loan Interest Rate

Financial Training / Budgeting						
With Financial Training	Count	Proportion	Literacy		Numeracy	
Yes	32	59%	7.09	55%	3.37	48%
No	22		6.95	53%	3.98	57%
Without Financial Training	Count	Proportion	Literacy		Numeracy	
Yes	40	41%	6.08	47%	3.63	52%
No	58		5.45	42%	3.50	50%

Table 9. Participants Maintaining a Budget on a Weekly or Monthly Basis